

## Banana Fiber Strands–Reinforced Polymer Matrix Composites

Haydar U. Zaman<sup>a</sup> & M. D. H. Beg<sup>a</sup>

Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang, Kuantan, Malaysia

### ABSTRACT

Banana fiber (BF)-reinforced low-density polyethylene (LDPE) unidirectional composites were fabricated by the compression molding process with 40 wt% fiber loading. The fibers were modified with methylacrylate (MA) mixed with methanol (MeOH) along with 2% benzyl peroxide under thermal curing method at different temperatures (50–90 °C) for different curing times (10–50 min) in order to have better compatibility with the matrix. The effect of fiber surface modification on the mechanical properties (tensile and impact properties) of the composites were evaluated. Monomer concentration, curing temperature, and curing time were optimized in terms of polymer loading and mechanical properties. The mechanical properties were found to be improved based on the improved interaction between the reinforcement and the matrix. Optimized BFs were again treated with 2–5 wt% starch solutions and composites made of 4% starch treated BF showed the highest mechanical properties than that of MA treated composites. Scanning electron microscopy (SEM) was performed to get an insight into the morphology of the composites. Water uptake and soil degradation test of the composites were also investigated.

**KEYWORDS:** Banana fiber, Low-density polyethylene, composite, methylacrylate, starch, mechanical properties

**DOI:** [10.1080/09276440.2016.1137178](https://doi.org/10.1080/09276440.2016.1137178)